



Natural Gas Vehicle Role in Fuel Diversity for California

Presentation to California Energy Commission

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California Natural Gas Vehicle Coalition



NGV Development in California

- ▶ NGV development spurred by CEC programs:
 - ▶ Methanol Transit Bus Program
 - ▶ Safe - Clean School Bus Program
 - ▶ Flex-fuel Program for LD Vehicles
 - ▶ Energy diversity and emissions targets
- ▶ Natural gas vehicle program designed to deliver superior emissions benefits over methanol (and gasoline/diesel)
- ▶ Natural gas industry viewed a domestic fuel better than methanol import option

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NGV Commercialization

- ▶ HD natural gas engines for
 - ▶ Transit
 - ▶ School buses
 - ▶ Refuse trucks
 - ▶ Other HD applications
- ▶ LD OEM product (~~Ford,~~
~~Chrysler,~~ GM, ~~Toyota,~~ Honda)
 - ▶ New NGV products for Europe



HD NGV Emission Performance

- ▶ Delivered 4.0 gram NOX for transit buses when standard was 5.0 grams
- ▶ Delivered 2.0-2.5 gram NOX when standard 4.0 grams
- ▶ Delivering 1.2-1.8 gram NOX when standard in 2.5 grams
- ▶ On target to deliver 0.2 gram engines in 2007 when diesel industry will only commit to 1.2 grams



LD Emission Performance

- ▶ OEM product the lowest emission products certified
- ▶ 1994 study of LD NGV vs. EVs
 - ▶ NGVs equal to EVs in southern Calif.
 - ▶ Assumed 50% electrical energy had zero emissions (hydro or out of state power)



Market Penetration

- ▶ 25,000 total NGVs in Calif. today
- ▶ 5,000 HD vehicles (transit buses, refuse trucks, school buses)
- ▶ 20,000 LD vehicles
- ▶ Displacing 70-75 million gallons of petroleum based fuel per year
- ▶ In terms of petroleum displaced -- equivalent to having 150,000 LD vehicles on road using natural gas
- ▶ Petroleum fuel displacement growing at 25-33% per year since 1994



Market Penetration Stations

- ▶ 300+ natural gas stations in California (compare to H2H goals)
- ▶ 50% stations public access
- ▶ 3% of stations for petroleum fueling
- ▶ None of stations are joint venture stations with petroleum companies
- ▶ NOTE: Argentina supporting a population of over 1 million vehicles with 450 CNG stations

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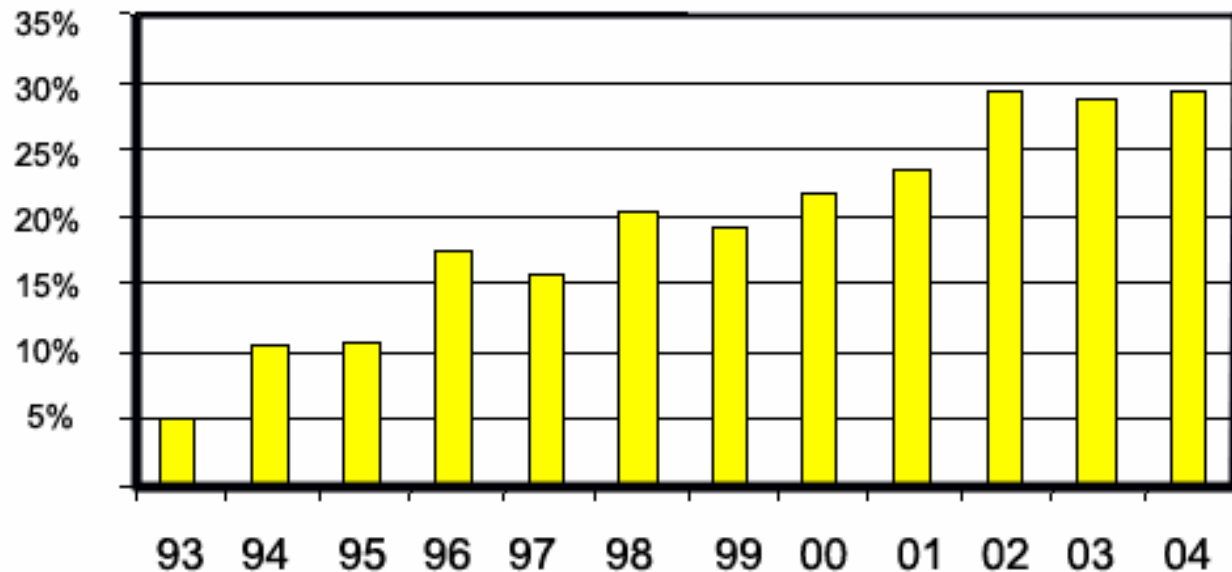
Lessons Learned

- ~~Build it and they will come~~
- Simultaneously develop stations and user fleets
- Focus on high fuel use fleet applications (transit, refuse, taxi, etc.)
- Public access station network now capable of building a consumer market



National Transit Market

Registered Natural Gas Transit Buses





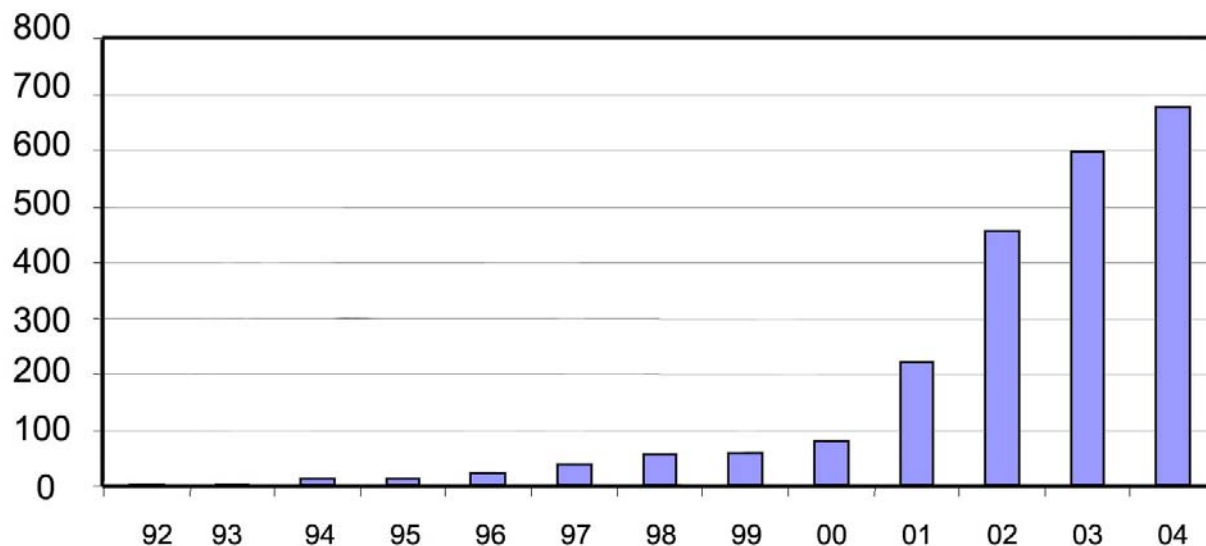
California Transit Market

- ▶ Southern California transit market over 50% natural gas
- ▶ Fleet rules will make 100% of southern California transit market natural gas



Refuse Market

Registered Natural Gas Refuse Haulers
in California





Petroleum Displacement Potential

- ▶ California Transit and Refuse markets have the potential of displacing 280 million gallons of diesel fuel per year – or 10% of current diesel consumption
 - ▶ 8,600 Transit Buses
 - ▶ 18,000 Refuse Trucks



Petroleum Displacement (cont.)

- ▶ School buses could displace 85 million gallons of petroleum per year
 - ▶ 17,000 School Buses



Projections for Future

- ▶ HD on-road vehicles – 100,000 or 25% of registered in state trucks
- ▶ LD fleets and consumer vehicles – 2 million
 - ▶ Home Refueling with FuelMaker
- ▶ Fuel displacement
 - ▶ Diesel – 700 million gallons
 - ▶ Gasoline – 1 billion gallons
 - ▶ 10% of California petroleum



Greater Penetration for NGVs

- ▶ NG from landfills – 7 million gallons per day
- ▶ LNG manufactured from stranded wells – 1 million gallons per day
- ▶ NG from agriculture digesters – 1 million gallons per day
- ▶ Could support 200,000 HD trucks



Ineffective Policies

- ▶ EPACT
- ▶ CEC “programs” not policies or strategies
- ▶ No integration of EPACT or CEC programs for the state
- ▶ Flex-fuel vehicles purchased but no petroleum displaced

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Ineffective Policies (cont.)

- ▶ CPUC LEV program
- ▶ Legislative authority to create program
- ▶ Sunset provision in late '90s destroyed momentum
- ▶ Oil industry lobbied that utilities were not fuel providers seriously limiting utility involvement
- ▶ Utility R&D that created products and technologies was eliminated

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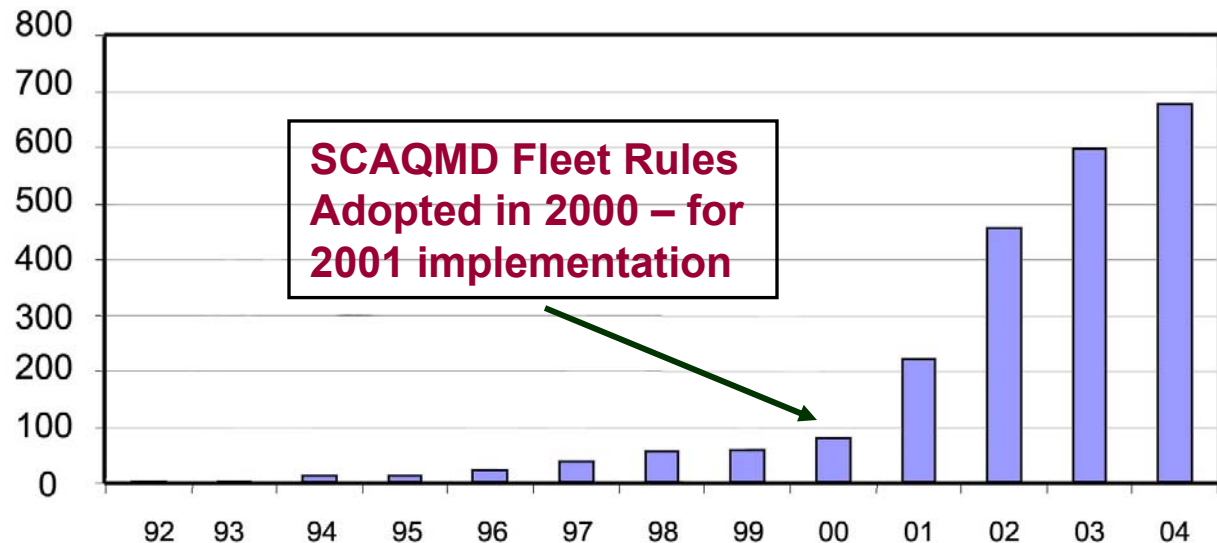
CARB Alt Fuel Station Regs

- ▶ Trigger of 20,000 alt fuel vehicles for oil companies to submit plans on how to integrate alt fuels into their stations
- ▶ Number of fleet vehicles discounted 75%
- ▶ Therefore need 80,000 alt fuel vehicles to initiate oil companies from doing anything??



SCAQMD Fleet Rules

Registered Natural Gas Refuse Haulers
in California





Collaborative Policies

- ▶ SCAQMD Fleet Rules
 - ▶ Emission reductions not in SIP
 - ▶ Projects eligible for incentive funding
- ▶ Carl Moyer Program
 - ▶ Incentives for cleaner than regulated emissions



What is needed?

- ▶ Codify ALL AB2076 goals in state law
 - ▶ Petroleum reduction
 - ▶ Alt Fuel penetration
- ▶ Decide how state would/could administer an alt fuels portfolio
 - ▶ CARB dilemma with SCAQMD Fleet Rules
- ▶ State incentives (e.g. Moyer type program for alt fuels)
 - ▶ Vehicles
 - ▶ Infrastructure
- ▶ Continual R&D to support new generations of products/technologies

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Concerns

- ▶ Separate alt fuels as blend stocks from stand alone fuels (CNG, LNG, propane, E85 etc.)
- ▶ Down the road – gasoline and diesel that are blended with alt fuels will only be known as petroleum products to consumers
- ▶ Market transformation to alt fuels will require greater participation from oil companies that control fuel distribution

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